α-DIVERSITY AND ZONATION OF INTERTIDAL MACROALGAE IN RELATION TO WATER QUALITY AT KANAMAI AND VASCO DA GAMA POINT OF THE KENYAN NORTH COAST.

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ABSTRACT

Spatial and temporal changes in α-diversity and zonation of macroalgae in the intertidal zones at Kanamai and Vasco da Gama Point along the Kenyan north coast were studied from March 1999 to August 2000 in order to investigate their relationship with water quality and season. Sampling was done monthly during spring low tide for 18 months. Quadrats of 0.5 m by 0.5 m were studied at specified habitats along established permanent belt transects from the sandy beach to the edge of the deep sea. In each quadrat, surface and sub-surface water was mixed and the pH, temperature and salinity measured. Macroalgae were collected from various substrata, identified and their percentage cover estimated.

The water was analysed for total suspended solids, oil\grease, faecal coliforms, N- and P-based nutrients. Chlorophyll-*a*, protein and carbohydrate content of the macroalgae species *Ulva reticulata, U. fasciata, Cystoseira myrica, Padina boergesenii, Gracilaria salicornia* and *Amphiroa fragilissima* were determined. The epiphytic load on the large macroalgal species (*Sargassum*, *Cystoseira myrica*, *C. trinoides, Turbinaria conoides*) and the seagrass *Thalassadendron ciliatum* was determined.

Species richness, Shannon's index, Simpson's Dominance index and the Modified Hill's Ratio were used as indicators of macroalgal species diversity. Zones were characterised by one dominant species or by two or three co-dominant species or by mixed species in relation to percentage cover. Data analysis was done using Kruskal-Wallis test Pearsons correlation and F-Test.

30 species of Chlorophyta, 36 of Rhodophyta and 21 of Phaeophyta were collected. The highest species richness was recorded for the reef platforms but there was no significant difference in the species richness at this habitat between Kanamai

and Vasco da Gama Point (Excel F-Test Probability, p = 0.9804). The deep-sea edge at the two sites were similar in relation to dominance of species (Excel F-Test Probability, p = 0.6952). There were significant differences in the species richness, abundance and evenness in distribution of the macroalgae at the near shore and seagrass bed habitats of Kanamai and Vasco da Gama Point. Macroalgal abundance was positively correlated with nutrients and faecal coliforms (r = 0.850 and 0.76 respectively) while high levels of total suspended solids and oil in water resulted in low macroalgal diversity.

Distinct bands of particular species running parallel to the seashore were recorded between the mean high water spring and mean low water spring. Moving seawards five zones of macroalgae identified at Kanamai were 1. *Cladophora* sp./*Chaetomorpha crassa*; 2. *Halimeda opuntia/Turbinaria* sp./*Gracilaria corticata*; 3. *Halimeda opuntia/Amphiroa fragilissima*; 4. *Cystoseira myrica/Padina* sp., 5. Mixed macroalgal type. Three zones identified at Vasco da Gama Point were 1. *Gracilaria salicornia/Ulva* sp./*Boergesenia forbesii/Sarconema filiforme*; 2. *Gracilaria corticata*, 3. Mixed macroalgal type.

Within-zone variation in species composition and abundance occurred with change in season as well as with total suspended solids, nutrient and faecal coliform count of water. Habitat-season-water quality interactions influenced variations in zonation, α-diversity and composition of macroalgae.

Evidence of sewage pollution and eutrophication needs further research. There is also a need to monitor constantly the water quality and chemical content of the macroalgae to explain further the higher diversity at Kanamai. Attention should not only be on effect of pollution on beaches, coral reefs and seagrass beds but also on macroalgae.